Recovery Plan for Choctawhatchee Beach Mouse (*Peromyscus polionotus allophrys*)
https://ecos.fws.gov/docs/recovery_plan/870812.pdf

Original Approved: 12 August 1987
Original Prepared by: U.S. Fish and Wildlife Service Southeast Region

We have identified best available information that indicates the need to amend recovery criteria for Choctawhatchee Beach Mouse (*Peromyscus polionotus allophrys;* CBM) since the recovery plan was completed. In this proposed modification, we synthesize the adequacy of the existing recovery criteria, show amended recovery criteria, and the rationale supporting the proposed recovery plan modification. The proposed modification is shown as an addendum that supplements the Choctawhatchee Beach Mouse, Perdido Key Beach Mouse, and Alabama Beach Mouse Recovery Plan (USFWS 1987) by adding delisting criteria for the CBM that were not developed at the time this recovery plan was completed. The original recovery objectives and the step-down outline are described on page 12 of the Recovery Plan. Recovery plans are non-regulatory documents that provide guidance on how best to help recover species.

For
U.S. Fish and Wildlife Service
Atlanta Georgia

Approved: Harry Williams
Acting **Regional Director, U.S. Fish and Wildlife Service**

Date: December 6, 2019

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

This amendment was developed using the most recent and best available information for the Choctawhatchee beach mouse (CBM) since the completion of the most current 5-Year Review: Summary and Evaluation (USFWS 2007). In addition to recent data, a primary source of information drawn upon was the 5-Year Review: Summary and Evaluation of 2007, which drew upon information from the following sources: the Recovery Plan for the Choctawhatchee Beach Mouse, Perdido Key Beach Mouse, and Alabama Beach Mouse (USFWS 1987), peer-reviewed scientific publications, unpublished reports, ongoing field survey results and information from qualified Service and State biologists, the final rule listing the subspecies, revised critical habitat (USFWS 2006), and peer review comments. The Service's lead recovery biologist for the Choctawhatchee beach mouse located at the Panama City Field Office completed this amendment. No part of the review was contracted to an outside party. All literature and documents used for this amendment are on file at the Panama City Field Office.

ADEQUACY OF RECOVERY CRITERIA

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination…that the species be removed from the list." Legal challenges to recovery plans (see Fund for Animals v. Babbitt, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five factors.

Recovery Criteria

The current Recovery Plan only provides downlisting criteria for the CBM, and they can be found on page 12 of the document (https://ecos.fws.gov/docs/recovery_plan/870812.pdf).

Synthesis

New information and research studies have been conducted since the Recovery Plan was finalized and new data have been received since the most recent 5-Year Review. This information is synthesized below. The assessment of threats, suggested recovery actions, and life history information included in the Recovery Plan and 5-Year Review largely remain applicable and relevant. Issues related to habitat (i.e., loss, fragmentation, connectivity, management, and restoration; Factor A) and predation from non-native, invasive species and free-roaming pets (Factor C) are still directly pertinent to the CBM's recovery. Relevant, ongoing issues and important advances in our understanding of the CBM that have been made since the Recovery Plan and 5-Year Review are summarized below.

Our partners have developed a noninvasive monitoring protocol that has been established across all public lands where CBM are found. This track tube monitoring allows us to determine where CBM are on a monthly or bi-monthly basis. While this method does not give us a population estimate, it is low impact to CBM and less intensive than regular live trapping. We get a snapshot of relative abundance over time to determine trends and when more intensive demographic monitoring or management is needed. Prior to Hurricane Michael making landfall on October 10, 2019, track tube data suggested CBM were doing well in the eastern part of their range. This encompassed many public lands within critical habitat unit CBM-5 West Crooked Island/Shell Island Unit. The other four critical habitat units are; CBM-1 Henderson Beach, CBM-2 Topsail Hill, CBM-3 Grayton Beach, and CBM-4 Deer Lake, which were not affected by Hurricane Michael. CBM-5 is further divided into public land names for management and reference: St. Andrews State Park mainland, Shell Island-State, Shell Island-Federal, and West Crooked Island. Those four public lands in CBM-5 were severely impacted by hurricane Michael, and we are currently trying to assess those populations and habitats. Initial assessments suggest the habitat was inundated over most of West Crooked Island and severely eroded on Shell Island-State and Shell Island-Federal. Prior to this hurricane, these three lands within CBM-5 were the stronghold for the species. Topsail Hill Preserve State Park has been a relatively stable population and continues to be so. Two units (Grayton Beach and Deer Lake) were of concern before the hurricane with extremely low numbers. Unpublished track tube data for 2018 suggests CBM may have been extirpated at Deer Lake. These two units have had low populations in the past, and reintroductions have occurred and been successful in 2003, 2005, and 2012. Although local extirpations are a normal part of CBM demographics, habitat

destruction and fragmentation have made it nearly impossible for CBM to recolonize and rebuild their population numbers without translocations from other populations. Other threats, such as free-roaming or feral cats and other non-native predators, require constant management and have not yet been adequately managed in these developed areas. Focus on non-native predators is a need in the smaller units surrounded by development as well as a focus on habitat restoration to enhance connectivity to these units.

The USFWS, Florida Fish and Wildlife Conservation Commission (FWC), and Florida State Parks conducted a reintroduction of CBM onto St. Andrews State Park-Mainland (SASP). While evidence suggests this area was once occupied by CBM, there was no written documentation of CBM occurrence in SASP. As of March 2018, the population was surviving and expanding with 24 new individuals trapped. Spring 2019 would have been two years post-reintroduction and another assessment needs to occur. This unit was also recently affected by Hurricane Michael and assessments are underway to determine the extent of habitat damage and population loss. This area did suffer from erosion along the primary and secondary dune system; however, the scrub dune habitat remains intact. Further assessments will determine how the population was affected. This task was identified in the Recovery Plan as a needed action towards recovery of CBM.

Connectivity between the larger core populations is a significant concern. This issue occurs mostly on private lands. Many private lands have developed too close to the Gulf and lost their dune ecosystem between the development and the water, this creates a barrier for CBM to get around the structures and non-native landscaping. We are working to address this issue with new construction, but older, existing developments continue to be a concern.

Genetic variation between the eastern and western portions of the CBM range has been apparent in the past. A current genetic study will identify the differences in CBM across the entire range. However, as different populations become extirpated or sustain catastrophic damage from hurricanes, we may need to translocate CBM from the most viable population to the other sites in need, thus mixing the east and west populations. The genetic and population management objectives will be discussed with partners following the current study results.

Choctawhatchee Beach Mice depend on three types of the coastal dune habitat (primary, secondary, and scrub). This coastal dune ecosystem is dynamic and will always be changing. Storms always have the potential to completely alter the coastal dune habitat as was experienced by Hurricane Ivan that directly impacted the entire range of CBM. With the potential for more frequent and intense storms, the coastal dune environment will not have the ability to grow and reform as it has in the past. It is likely we will lose much of the three stages of the coastal dune habitat.

The Recovery Plan does not specifically address climate change or sea level rise in the CBM recovery criteria or recovery actions. Using the NOAA Sea-level Rise Viewer tool (NOAA 2017); with a 3-foot rise in sea-level, CBM habitat around the coastal dune lakes begins to encroach into the low lying coastal dune swales and a wider more permanent outfall starts to be noticed. Connectivity to available dune habitat will be severed once permanently underwater. Bays and inland waters connected to the Gulf quickly engulf coastal dune swales from rising backwaters and become fragmented by newly formed connections between the bay and gulf.

This intermediate scenario is predicted to occur in 50-70 years (NOAA 2017). The higher dune habitat will still be available, but upland access and connectivity will be severed.

Free-roaming and feral cat populations in CBM range are largely comprised of outdoor pets and unwanted pets. The free-roaming/feral cats are usually associated with development near the coastal dune habitat. In the western portion of CBM range, approximately 18 cats were removed over the past year, with the majority being in Grayton Beach and Deer Lake State Parks.

Additional information needs and data gaps still remain that could impede recovery. For example, how quickly CBM will begin to use dune restoration sites and berms, can CBM repopulate on their own the areas severely impacted by the recent hurricane, and how quickly can their dune habitat recover?

AMENDED RECOVERY CRITERIA

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be downlisted to threatened, or that the protections afforded by the Act are no longer necessary and the CBM may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from an endangered species to a threatened species. The term "endangered species" means any species (species, sub-species, or distinct population segment) which is in danger of extinction throughout all or a significant portion of its range. The term "threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Revisions to the Lists, including delisting or downlisting a species, must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is an endangered species or threatened species (or not) because of threats to the species. Section 4(b) of the Act requires that the determination be made "solely on the basis of the best scientific and commercial data available." Thus, while recovery plans provide important guidance to the Service, States, and other partners on methods of minimizing threats to listed species and measurable objectives against which to measure progress towards recovery, they are guidance and not regulatory documents.

Recovery criteria should help indicate when we would anticipate that an analysis of the species' status under section 4(a)(1) would result in a determination that the species is no longer an endangered species or threatened species. A decision to revise the status of or remove a species from the Federal Lists of Endangered and Threatened Wildlife and Plants, however, is ultimately based on an analysis of the best scientific and commercial data then available, regardless of whether that information differs from the recovery plan, which triggers rulemaking. When changing the status of a species, we first propose the action in the *Federal Register* to seek public comment and peer review, followed by a final decision announced in the *Federal Register*.

Herein, we provide delisting criteria for the CBM as the Recovery Plan only developed downlisting criteria as discussed above.

Downlisting Recovery Criteria
We are not amending the existing downlisting criteria. Please refer to page 12 of the Recovery Plan.

Delisting Recovery Criteria
The Choctawhatchee beach mouse will be considered for delisting when all the following criteria have been met:

1. Populations inhabiting all five (5) critical habitat units (see Figure 3 & 6 of the Recovery Plan) plus three (3) additional Habitat Conservation Plan (HCP) covered lands that directly connect to the critical habitat units exhibit stable or increasing trends, evidenced by natural recruitment and multiple age classes (Factor A).
2. Habitat connectivity shall be maintained throughout the range to a level that genetic diversity among populations does not require translocations, captive breeding, human intervention, and can rebound from catastrophic weather events (Factors A and E).
3. All designated CBM critical habitat under public ownership (Federal, State, and Local entities) is protected and under a conservation management plan and private lands supporting CBM implement conservation measures that focus on coastal dune habitat and beach mouse conservation (Factor A).
4. Non-native predator and competitor species removal (specifically, free-roaming/feral cats) shall be conducted to a degree that all CBM populations in all 5 critical habitat units will remain viable for the foreseeable future (Factors C and D).
5. Regulatory requirements by state and local governments that limit habitat destruction, non-native predators, and actively pursue recovery objectives shall be established and enforced (Factor D).
6. When, in addition to the above criteria, it can be demonstrated that habitat loss associated with climate change/sea level rise and development are diminished such that enough suitable habitat remains in the foreseeable future for CBM to remain viable (Factor E).

Justification
The proposed delisting criteria reflect the best available and most up-to-date information of the CBM, while incorporating information still relevant from the Recovery Plan. Furthermore, the delisting criteria developed reflect the species' overarching recovery strategy, and are consistent with current goals, objectives, and known risk levels.

Specifically, each delisting criterion ensures that the underlying causes of decline and impediments to recovery will be addressed and mitigated by:

Criterion 1. Providing redundancy through multiple populations and sufficient habitat, and reaching demographic parameters that allow for resilient and stable populations. Providing natural, functional connectivity is critical because the intensive management actions required to lessen the effects of fragmentation is very labor intensive and only provides short-term solutions. Since populations of many small mammals, including the CBM, fluctuate cyclically, it is necessary to evaluate population demographics amongst multiple generations to assess true trends. For the CBM it is believed that a minimum of eight populations exhibiting these traits are necessary to provide sufficient redundancy to ensure the species will no longer require

protection under the Act. Eight populations equates into one in each critical habitat unit CBM-1, CBM-2, CBM-3- and CBM-4, plus four populations in CBM-5. The four populations equates to a population in each of the four managed public lands units mentioned above. These units are defined in the Critical Habitat Rule (USFWS 2006). Each of the eight populations should show an average occupancy rate of 85% or better over a 20 year time period based on current track tube monitoring. Additionally, habitat connectivity between each of the critical habitat units through the private lands is essential for recovery/delisting to be achieved. To implement this criterion, a time frame of at least 20 years is necessary to evaluate population trends and whether these areas can sustain population declines after impacts from stochastic events such as hurricanes.

Criterion 2. Providing resiliency through maintenance of genetic connectivity across the entire range to ensure subspecies long-term viability. For CBM, habitat connectivity between critical habitat units will ensure that gene flow can maintain genetically diverse populations, prevent future extended bottlenecks and isolated populations, and allow extirpated populations to reestablish themselves without translocations and captive breeding. Management actions are in place to assess the genetic diversity when required. Management and preservation of north-south and east-west habitat corridors are required to achieve the needed genetic diversity across the species range and between habitat units.

Criterion 3. Developing/updating management plans and implementing recovery actions with our partner agencies on publicly owned lands will ensure sufficient habitat and proper management is available into the future. Specific commitments should be made in management plans that indicate management efforts will focus on restoring degraded or damaged coastal dune habitat back to high-quality coastal dune habitat following significant storm damage or human induced damage. Restoration efforts should consider CBM as well as other coastal species needs.

Criterion 4. Providing a long-term solution to significantly reduce or eliminate the threat of non-native species. Non-native predator and competitor species should have no negative impacts to the viability of any CBM population. One of the biggest threats to beach mice are predation form free roaming/feral cats. Currently there are efforts by our partners to reduce the threat of non-native species to our native listed species. Specific mechanisms to quickly identify and remove free roaming/feral cats have been adopted in state park management plans and habitat conservation plans. Consistency and collaboration amongst implementing these plans should be made. Certainty of funding and objectives focused on CBM are still needed.

Criteria 5 & 6. Ensuring sufficient habitat is expected to remain for long-term persistence, despite habitat changes and habitat loss projected due to climate change/sea level rise. Regulatory actions focused on CBM conservation by local and State government entities is also needed to help meet this criteria. A Habitat Conservation Plan to address the coastal development pressures in Walton County is needed. Without a mechanism such as this, connectivity between the critical habitat units cannot be achieved. The CBM is highly susceptible to localized extirpations and without enough habitat of sufficient quality, populations are increasingly vulnerable to threats from non-native species, climate change, and demographic

limitations (i.e., populations are too small to withstand natural levels of predation, environmental variation).

Together, these recovery criteria cover threats related to habitat loss and fragmentation, non-native predators, genetic diversity, and climate change, all of which are likely drivers of the CBM's population demographics and the species' long-term persistence.

Rationale for Amended Recovery Criteria

The existing criteria for CBM on page 12 of the Recovery Plan (USFWS 1987) (https://ecos.fws.gov/docs/recovery_plan/870812.pdf) included only downlisting criteria. The amended delisting recovery criteria provide an avenue for connectivity through private lands to connect the larger core CBM populations on public lands. It is imperative that the primary dune systems be restored along these private lands. It is the main pathway for connectivity between the existing CBM populations. When populations become extirpated or significantly imperiled due to hurricanes or other climate related actions, the habitat needs to be restored or maintained to allow CBM to repopulate these areas. Scrub habitat is a valuable resource to preserve throughout the entire range, as this is the only area CBM will be able to survive a major hurricane and be able to repopulate from. CBM and other beach mice are currently experiencing this situation due to Hurricane Michael. Recovery of CBM can only be achieved when the habitat is available and connectivity is established to ensure genetic diversity. A private/public partnership is needed to fully recover CBM. Local governments and land managers must actively participate toward recovery by implementing recovery actions set forth by the recovery lead.

With the proposed amendments, delisting has been clearly defined with measurable, objective criteria in keeping with the recovery strategy and goals outlined in the Recovery Plan. These criteria address what is necessary to ensure resiliency, redundancy, and representation by addressing factors that threaten the species. In achieving these criteria, we expect the CBM to have a low probability of extinction for the foreseeable future and have stable populations needed for long-term recovery. We will work together with our partners to strategically and efficiently implement the new criteria.

LITERATURE CITED

National Oceanic and Atmospheric Association (NOAA). 2017. Global and Regional Sea Level Rise Scenarios for the United States. NOAA Technical Report NOS CO-OPS 083. Silver Spring, MD.

U.S. Fish and Wildlife Service. 1987. Recovery plan for the Alabama beach mouse (*Peromyscus polionotus ammobates*), Perdido Key beach mouse (*P. p. trisyllepsis*), and Choctawhatchee beach mouse (*P. p. allophrys*). U.S. Fish and Wildlife Service, Atlanta, Georgia.

U.S. Fish and Wildlife Service. 2006. Designation of critical habitat for the Choctawhatchee beach mouse, Perdido Key beach mouse, and St. Andrew beach mouse: Final Rule. U.S. Fish and Wildlife Service. Washington, DC.

U.S. Fish and Wildlife Service. 2007. Choctawhatchee Beach Mouse (*Peromyscus polionotus allophrys*) 5-Year Review: Summary and Evaluation. https://ecos.fws.gov/docs/five_year_review/doc1081.pdf

APPENDIX – SUMMARY OF PUBLIC COMMENTS RECEIVED AND RESPONSES

We published a notice of availability in the Federal Register on August 6, 2019 (84 FR 151) to announce that the draft amendment to the Choctawhatchee Beach Mouse Recovery Plan was available for public review, and to solicit comments by the scientific community, State and Federal agencies, Tribal governments, and other interested parties on the general information base, assumptions, and conclusions presented in the draft revision. We received two responses in total. These included comments from interested citizens as well as non-governmental organizations and interest groups.

Public comments ranged from providing minor editorial suggestions to specific recommendations on plan content. We have considered all substantive comments. We thank the reviewers for these comments and to the extent appropriate, we have incorporated the applicable information or suggested changes into the final recovery plan amendment.

Below, we provide a summary of public comments received; however, some of the comments that we incorporated as changes into the recovery plan amendment did not warrant an explicit response and, thus, are not presented here. We also provided copies of all comments received during the formal public comment period to all relevant Federal agencies for their consideration prior to implementation of the final recovery plan, in accordance with section 4(f)(5) of the Act.

Comment 1: In the Synthesis, we suggest a statement be added to the summary for the SASP unit to the effect that "There was little information about the size and status of the CBM population in the SASP unit prior to the hurricane." Also, the Synthesis says trapping was to be done at SASP in spring 2019, but no assessment via trapping was done in spring 2019. This should be clarified.

Response 1: The text was revised to reflect that the two year assessment has not occurred but needs to, and that 24 new individuals were trapped in 2018.

Comment 2: Also in the Synthesis, in the paragraph on genetic variation, we suggest a statement be added to the effect that "The degree of genetic divergence between the eastern and western portions of the CBM range needs to be further investigated so that any future species management or conservation actions will be carried out in a way that maintains the species' genetic diversity."

Response 2: Language was added to clarify by referring to an ongoing genetic study and future needed discussions with partners based on those data.

Comment 3: In the criteria, we are concerned there is no clear period of time over which to assess stability and the terms "multiple generations" and "foreseeable future" are vague and undefined as used there. For small mammal species such as this, there could be multiple generations within a year. We recommend that explicit periods of time be

incorporated to provide better guidance. For example, 6 years instead of multiple generations as a measure for viability or stability and 50-75 years instead of foreseeable future.

Response 3: We agree, and the 20 year period was added into the justification for Criterion 1. Twenty years is consistent with the delisting criteria in St. Andrew beach mouse.

Comment 4: We recommend that all the delisting criteria be stated using terms that are measurable and specific to provide greater clarity and make it possible to measure accurately whether a criterion has been achieved. For example, list thresholds for number of breeding individuals, amount of available, high-quality CBM habitat, including thresholds for proportion of habitat that is occupied, and a quantifiable measure of threat of predation.

Response 4: It is stated that all critical habitat on public lands be managed for beach mice and the coastal ecosystem. Also, we added occupancy metrics based on our current long term track tube monitoring for each of the critical habitat units.

Comment 5: For criterion 1, we recommend that "stable" be replaced by "viable" and that there should be a specified minimum period of time over which viability is maintained (e.g., 10 years).

Response 5: We added "over a 20 year time period based on current track tube monitoring" to the justification. This makes it consistent with the St Andrew beach mouse delisting criteria. Also stable or increasing trends should capture viability. Viable is in the document numerous times as well.

Comment 6: It is possible that monitoring of the CBM populations will not be done with sufficient frequency or with necessary methods (e.g., live trapping) to accurately measure status (i.e., population size) and trends (i.e., fluctuations in population size). Therefore, we recommend the term "viable" be defined for populations, especially any new populations, in terms of a threshold for an amount of suitable, occupied habitat for each population as the primary criterion in combination with a specific measure of occupancy. An appropriate measure of occupancy over a stated period of time (e.g., 80% occupancy per survey, on average across 10 years) should be specified as a threshold to demonstrate viability.

Response 6: We have always chosen to focus on conservation of habitat acres as a surrogate for beach mouse population numbers due to their highly fluctuating and uncertainty of population numbers over a short period of time. Plus the inability to obtain regular population estimates for a given population makes it difficult to set and reach a specified number of individuals. We state in Criterion 3 that all critical habitat on public lands would need to be protected and under a conservation management plan that focuses on the coastal dune ecosystem and beach mouse conservation. Also that private lands would need to adopt conservation measures. We also added a 20 year timeframe as a target in the justification.

Comment 7: For criterion 1, we agree that 8 viable populations would be good, but we suggest including in the Justification the evidence or expert opinion on which that number is

based. In addition, for more effective conservation going forward, we believe it is essential to state the area, including specific locations or site names, across which each of those populations is proposed to occur. Further, for CBM conservation to be most effective we believe language in this criterion, or in the Justification for it, should be clear that where potentially suitable habitat is contiguous across multiple parcels of land, then that area would be managed as one population. For example, habitat on Grayton Beach State Park and habitat on the adjacent Water Color property. If possible, a map should be included that shows areas encompassed by each population, the locations of the critical habitat units and all Habitat Conservation Plan lands within the CBM range.
Response 7: Clarification was made in this document to reference the full critical habitat unit name. Also, the maps are in the recovery plan and will be included in the new 5-years reviews. This delisting criteria is part of the overall recovery plan, but we could include the critical habitat unit maps for ease of reference.

Comment 8: We agree with the goal of criterion 2 to maintain connectivity throughout the range, but we suggest the wording could be more specific to avoid any confusion about what is needed. For example, "Corridors of suitable habitat are maintained that enable beach mice to move between units or sites occupied by CBM populations." Then in the Justification, supplement that with a statement that habitat connectivity allows genetic diversity to be maintained and extirpated populations to be re-established without the need for translocations or captive breeding. Include a measurable threshold for success as well.
Response 8: Clarification was added in Criterion 2 and justification sections.

Comment 9: For criterion 3, we recommend changing the wording from "...a conservation mechanism that addresses beach mice" to "...a conservation mechanism that requires the conservation of beach mice."
Response 9: Done, revised language was added.

Comment 10: We recommend having criterion 4 state "There are no negative impacts to the viability of any CBM population caused by competition or predation from non-native species..." Include a measure of time for stability (e.g., 10 years) and a measure to indicate that non-native species are maintained at or below a threshold level on all sites or units occupied by CBM over that time. Then, in the Justification provide language summarizing potential negative impacts to the viability of beach mouse populations from non-native species including competition with non-native house mice (*Mus musculus*) and predation from free-roaming and feral house cats.
Response 10: Done, revised language was added.

Comment 11: We also recommend that a habitat management criterion be added to specify that occupied or potentially suitable beach mouse habitats existing on publicly owned lands or lands protected by a conservation easement should be managed appropriately and regularly - and actively restored if damaged - so that conditions remain of high-quality for CBM populations. Further clarification should be provided a) to define what standard is applied for determining "high-quality" conditions, b) to clarify that "damaged" is damaged or eroded as a result of human activities or natural (e.g., storms) events, and c)

to clarify that "actively restored" is appropriate, active habitat restoration activities carried out to restore an area to high-quality conditions. And, we also recommend being clear in this criterion that active habitat management and restoration activities need to maintain a sufficient amount of suitable habitat available for the CBM populations to remain above the threshold defined as the minimum for a viable population. Further, it should be stated clearly in this criterion that restoration of beach mouse habitat needs to be a high priority after severe erosion caused by storms on state, federally, or county managed lands, and should be done in coordination with actions to improve conditions for other state or federally imperiled species.

Response 11: Done, more language was added to criteria 3 and the justification section.

Comment 12: In Criterion 2 justification section this is a bit confusing - between populations ...leads to diverse population. Replace with "For CBM, habitat connectivity between critical habitat units will ensure that gene flow can maintain genetically diverse populations"

Response 12: Clarified language in justification section for Criterion 2.

Comment 13: In justification Criterion 2; instead of...preserves the subspecies and prevent bottlenecks. Maybe say "ensures subspecies long-term viability" instead?

Response 13: Done, suggested change was made.

Comment 14: "Our partners have developed a noninvasive monitoring protocol that has been established across all public lands where CBM habitat and connectivity are found." Connectivity here is used as a noun. I would suggest rewording this to read "...public lands where CBM habitat use, including for connectivity are found."

Response 14: Done, suggested edit was made.

Comment 15: We get a snapshot over time to determine trends and when more intensive management is needed." This seems a bit vague but may be desired to be so. Alternatively; I suggest... "We get a snapshot of relative abundance over time to determine trends and when more intensive demographic monitoring is needed."

Response 15: Done, suggested edit was made.

Comment 16: "Genetic variation between the eastern and western portions..." This is somewhat picky but variation from east to west can mean a couple things, importantly it is the genetic divergence being seen that has indicated strong effects of genetic drift due to lack of connectivity and small population sizes. Change to; "Genetic divergence between the eastern and western portions..."

Response 16: Done, suggested edit was made.

Comment 17: "Criterion 2. Providing resiliency through maintenance of genetic diversity across the entire range preserving the subspecies and prevent bottlenecks. For CBM, habitat connectivity between the populations will lead to a genetically diverse population. Management actions are in place to assess the genetic stability when required. Management and preservation of north south and east-west habitat corridors are required to achieve the needed genetic diversity across the species range and facilitate

recolonization of areas after localized extirpations." The logic here is understood in spirit; however, the following wording will make this more precise with respect to the genetic effects of maintaining connectivity and its benefits: "Criterion 2. Providing resiliency through the maintenance of genetic connectivity across the entire range, thus preserving the subspecies and preventing future extended bottlenecks. For [subspecies x], habitat connectivity between the populations will increase and maintain the genetic variation of isolated populations. Management actions are in place to assess the genetic diversity when required. Management and preservation of north south and east-west habitat corridors are required to achieve the needed genetic diversity across the species range and facilitate recolonization of areas after localized extirpations."

Response 17: Done, suggested edits were made.

Comment 18: "This amendment was developed using the most recent and best available information…" I trust that this is the case, however, I was surprised that such information was not identified in the document, nor provided in "Literature cited" sections. I suggest changing the last section from "Literature Cited" to something like "Further reading" or "Relevant document".

Response 18: The literature is cited in the recovery plans, and 5-year reviews. We refer to these documents for more detailed information.